

SPECIFICATION

BEDSORE PREVENTING METHOD, BEDSORE PREVENTING SHEET,
BEDSORE PREVENTING CLOTH, BEDSORE PREVENTING
5 MATTRESS, BEDSORE PREVENTING BED, BEDSORE PREVENTING
BED PAD, BEDSORE PREVENTING PRODUCT, AND METHOD FOR
MANUFACTURING THE SAME

TECHNICAL FIELD

10 The present invention relates to a method for
preventing bed sore, which may occur to a bedridden
elderly patient or an injured person, and also
relates to bed sore preventing sheet, bed sore
preventing cloth, bed sore preventing mattress,
15 bed sore preventing bed, bed sore prevention bed pad,
and bed sore preventing product, and also to a method
for manufacturing these products.

BACKGROUND ART

20 When a bedridden elderly patient or a sick or
injured person lies on mattress or on bed for long
time, skin on back, shoulder, buttocks or backside
of legs in contact with bedding materials such as
mattress, bed, etc. becomes vulnerable or may be
25 collapsed. This is generally called "bed sore". To

prevent the bedsore, a number of methods have been suggested and practiced in the past, such as the method to change the position of patient's body, to perform massage, to keep the patient's body clean,
5 etc.

However, it is practically impossible to effectively prevent bedsore by the conventional methods as described above.

It is an object of the present invention to
10 provide a bedsore preventing method for effectively preventing bedsore, a bedsore preventing product such as bedsore preventing sheet, bedsore preventing cloth, bedsore preventing mattress, bedsore preventing bed, and bedsore preventing bed pad, and
15 also to provide a method for manufacturing these products.

DISCLOSURE OF THE INVENTION

In the past, it has been believed that bedsore
20 is caused by poor blood circulation due to pressure on patient's body because of long-term contact with bedding materials. The present inventor has found that, when a patient has been lying for long time on bed, smelling components and harmful components are
25 generated and stagnated around the patient's body,

and skin of the patient is eroded under the influence of these components and bed sore occurs. Then, it was found that bed sore can be prevented by effectively decomposing and eliminating these
5 smelling components and harmful components. To attain the above object, the present invention provides a sheet made of nonwoven fabric or paper, and a deodorant also serving as an agent for removing harmful substances (hereinafter referred as
10 "deodorant/agent") to be impregnated in the sheet and processed by graft polymerization. By arranging the sheet and the deodorant/agent on a portion of a patient's body in contact with a bedding material or on surface or inside of the
15 bedding material, bed sore on the patient's body can be prevented.

Specifically, the present invention provides a method for preventing bed sore on body of a patient, comprising the step of:

20 arranging a bed sore preventing product on a portion of a bedridden patient's body in contact with bedding material or on surface or inside of the bedding material, whereby the bed sore preventing product comprises:

25 a sheet made of nonwoven fabric or paper; and

a deodorant also serving as an agent for removing harmful substances being impregnated in the sheet and processed by graft polymerization.

Further, the present invention provides a
5 bedsore preventing sheet, which comprises a sheet made of nonwoven fabric or paper; and

a deodorant also serving as an agent for removing harmful substances being impregnated in the sheet and processed by graft polymerization.

10 Also, the present invention provides a bedsore preventing cloth, which comprises a sheet made of nonwoven fabric or paper; and

a deodorant also serving as an agent for removing harmful substances being impregnated in the
15 sheet and processed by graft polymerization.

Further, the present invention provides a bedsore preventing mattress, which comprises a sheet made of nonwoven fabric or paper and used as surface material or used inside; and

20 a deodorant also serving as an agent for removing harmful substances being impregnated in the sheet and processed by graft polymerization.

Also, the present invention provides a bedsore preventing bed, which comprises a sheet made of
25 nonwoven fabric or paper and used as a surface

material or used inside; and

a deodorant also serving as an agent for removing harmful substances being impregnated in the sheet and processed by graft polymerization.

5 Further, the present invention provides a bed sore preventing bed pad, which comprises a sheet made of nonwoven fabric or paper and used as a surface material or used inside; and

a deodorant also serving as an agent for
10 removing harmful substances being impregnated in the sheet and processed by graft polymerization.

Also, the present invention provides a method for manufacturing bed sore preventing product, which comprises the steps of:

15 impregnating a sheet made of nonwoven fabric or paper with a deodorant also serving as an agent for removing harmful substances in liquid state;

drying the sheet thereafter; and

irradiating γ -ray to the sheet for graft
20 polymerization before or after the drying step.

Further, the present invention provides a method for manufacturing bed sore preventing product, which comprises the steps of:

unwinding a sheet made of nonwoven fabric or
25 paper from a roll of the sheet;

impregnating the unwound sheet with a deodorant also serving as an agent for removing harmful substances in liquid state;

drying the sheet thereafter;

5 irradiating γ -ray to the sheet for graft polymerization before or after the drying step; and drying and winding up the sheet irradiated with the γ -ray, and forming a new roll.

Also, the present invention provides a method
10 for manufacturing bed sore preventing product, the method comprising a process for manufacturing paper, said process comprising the steps of beating pulp used as raw material for paper, adding water, and making paper, wherein:

15 the method for manufacturing a bed sore preventing product comprises the step of intermingling a deodorant also serving as an agent for removing harmful substances processed by graft polymerization method and using pulp as a base
20 material, and intermingling the deodorant also serving as an agent for removing harmful substances in the pulp.

Further, the present invention provides a bed sore preventing product, manufactured from a pulp
25 used as raw material for paper and a deodorant also

serving as an agent for removing harmful substances and using pulp as base material.

Also, the present invention provides a method for preventing bed sore comprising the steps of;

5 impregnating threads with a deodorant also serving as an agent for removing harmful substances:

 weaving a textile material from the threads after graft polymerization; and

 arranging the bed sore preventing product made of
10 the textile material on a portion of a patient's body in contact with a bedding material or on surface or inside of the bedding material for preventing and protecting the patient's body from bed sore.

15 Further, the present invention provides a bed sore preventing product, manufactured by impregnating threads with a deodorant also serving as an agent for removing harmful substances, and woven from the threads after graft polymerization.

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BRIEF DESCRIPTION OF THE DRAWINGS

 Fig. 1 is a schematical plan view showing a preferred embodiment of a bed sore preventing sheet according to the present invention;

25 Fig. 2 is a plan view of the bed sore preventing

sheet of Fig. 1 placed between a mattress or a bed and a bed cloth;

Fig. 3 is a drawing to show an apparatus and a process (a first embodiment) for manufacturing a
5 roll of a bed sore preventing sheet according to the present invention;

Fig. 4 is a flow chart showing a method (a second embodiment) for manufacturing a bed sore preventing sheet of the present invention from
10 paper; and

Fig. 5 is a flow chart showing another method (a variation of the second embodiment) for manufacturing a bed sore preventing sheet of the present invention from paper.

15 In the figures, reference numeral 10 represents a bed sore preventing sheet, 12 a bed cloth, 20 a bed sore preventing sheet before cutting (a sheet before it is impregnated with a deodorant also serving as an agent for removing harmful substances),
20 20A and 20B each represents a roll, 22 - 38 each represents a roller, 40 and 42 each represents a sponge member, 46 represents a container, 48 a valve, 50 a liquid deodorant also serving as an agent for removing harmful substances, 52 is a heater, 54 hot
25 air, 56 a γ -ray irradiating system, and 58 γ -ray.

BEST MODE FOR CARRYING OUT THE INVENTION

Description will be given below on preferred embodiments of the present invention referring to the drawings. Fig. 1 is a plan view schematically showing a bed sore preventing sheet 10 used for the prevention of bed sore according to the present invention. This bed sore preventing sheet 10 comprises nonwoven fabric or paper, and it is impregnated with a specific type of liquid and is then dried. The sheet made of nonwoven fabric or paper is impregnated with a specific type of liquid in order that it can provide deodorant effect and also an effect to remove harmful substances. This bed sore preventing sheet 10 is placed between a bed or a mattress and a bed cloth laid above the mattress.

Fig. 2 is a plan view schematically showing the bed sore preventing sheet 10 of Fig. 1 laid under the bed cloth 12. In case of a normal single size mattress or bed, the bed sore preventing sheet is about 80 - 90 cm in width and about 90 - 150 cm in length. The bed sore preventing sheet is simply laid between mattress or bed and bed cloth, while it may be fixed to bed cloth, mattress or bed using

adhesive tape.

Fig. 3 is a drawing to show a process for manufacturing the bed sore preventing sheet of Fig. 1. The bed sore preventing sheet of the present invention has been developed by the present inventor from a sheet for deodorizing also used for removing harmful substances. This deodorizing sheet has been already developed by the present inventor for the purpose of removing offensive smell in room or of eliminating harmful substances generated from new types of building materials. The sheet itself is the same as the deodorizing sheet for eliminating offensive smell and for removing harmful substances. This deodorizing sheet has been already developed and a patent application has been filed (Japanese Patent Application 11-217336). Fig. 3 shows a process of a first embodiment of a method for manufacturing a sheet for removing offensive smell and for eliminating harmful substances. Specifically, Fig. 3 shows an apparatus and a process for manufacturing a roll of sheet by irradiating γ -ray for graft polymerization to a sheet, which is impregnated with a "deodorant/agent" (i.e. a deodorant also serving as an agent for removing harmful substances). A sheet 20 is

unwound from a roll 20A of a sheet (nonwoven fabric or paper) before it is impregnated with a deodorant/agent, and the sheet 20 is moved by rollers 22 - 28 in a direction shown by an arrow M1.

5 It is finally wound up, and a roll 20B is formed.

The roll 20B is rotated by a driving mechanism (not shown), and the rollers 22 - 28 are also partially rotated by a driving mechanism (not shown). In a container 46, a deodorant/agent in liquid state is held. When a valve 48 is opened, this
10 deodorant/agent 50 is dropped down to a sponge member 42 under the container. Under the sponge member 42, another sponge member 40 is arranged to interpose the sheet 20 between the two sponge
15 members. These two sponge members 40 and 42 are positioned face-to-face to each other and pushed under a predetermined pressure against each other by means of a mechanism (not shown).

These sponge members 40 and 42 are impregnated
20 with the deodorant/agent 50 which is dropped down from the container 46. When the sheet 20 is moved between these sponge members, the deodorant/agent 50 in liquid state is impregnated into the sheet 20. The sheet 20 is carried in zigzag manner by a
25 plurality of rollers 30 - 38, and this is to dry the

wet sheet 20 by hot air 54 which is sent from a heater 52. Before or after this drying process, γ -ray 58 generated by a γ -ray irradiating system 56 is irradiated to the sheet 20. In the figure, γ -ray is irradiated after the drying process. By the irradiation of this γ -ray, graft polymerization occurs on the impregnated deodorant/agent 50. Carrying speed and winding speed are controlled in such manner that the sheet is wound up as a roll 20B after the drying process has been completed.

As the deodorant/agent 50 in liquid state, a deodorant/agent for graft polymerization is used. The deodorant/agent for graft polymerization has a graft chain, to which a functional group is introduced. As the functional group, a cation exchange group or a sulfonic acid group and a carboxylic group may be used. A deodorant using the cation exchange group is described in Japanese Patent Publication 7-79593. More concretely, it is a molded product comprising a base material of pulp and/or polyolefin and having a cation exchange group. To produce the cation type deodorant, a reactive monomer is combined with the molded product by graft polymerization. A deodorant using the sulfonic acid group and the carboxylic group is described in

an article titled "Performance Evaluation of Deodorant using Pulp Ball as Base Material" in "Kankyo Gijutsu (Environmental Technique)", Vol. 22, No.5, 1993, pp.22-25). By graft polymerization
5 method under simultaneous γ -ray irradiation, sulfonic acid group and carboxylic group are introduced into cellulose type pulp ball.

These graft-polymerized deodorant/agent induces chemical reaction with substances causing offensive
10 smell and harmful substances, and it turns these substances to odorless and harmless substances. The deodorizing principle is different from that of activated carbon powder or granular activated carbon, which physically adsorbs the substances causing
15 offensive smell. Therefore, the graft-polymerized deodorant/agent is not engaged in further reaction after the chemical reaction with a predetermined quantity of bad-smelling substances. In this sense, it is different from activated carbon, which adsorbs
20 a certain quantity of bad-smelling substances and it is then saturated and releases the adsorbed smelling substances. The time required for inducing the chemical reaction with a certain quantity of smelling substances varies according to quality and
25 quantity of the smelling substances, and it is not

always the same. In a normal type house, the effects of chemical reaction last for a period of about 3 - 6 months. Harmful substances such as formaldehyde, toluene, xylene, wood preservative, plasticizer, agent for preventing and killing ant, etc. can be almost completely eliminated within a period from several days to several weeks.

In the process for manufacturing the sheet shown in Fig. 3, the sheet 20 is already manufactured in advance, and deodorant effect is added to it. On the other hand, it is also possible to add the effects to deodorize and to remove harmful substances in the process to manufacture the sheet from paper. Fig. 4 is a flow chart showing a second embodiment of a method for manufacturing the sheet for deodorizing and removing harmful substances of the present invention.

In Step S1, a raw material pulp is charged. In this case, another type of solid raw material is added in addition to the pulp i.e. the normal raw material for paper. This solid raw material comprises a pulp added with a deodorant/agent manufactured by graft polymerization method. These two types of raw materials are agitated in Step S2. Then, as in the normal paper manufacturing process,

paper is manufactured through the processes of beating (Step S3), water-adding (Step S4), additional beating (Step S5), paper-making (Step S6), and drying (Step S7).

5 In the flow chart shown in Fig. 4, the deodorant/agent manufactured by graft polymerization and using pulp as base material is mixed with the initial raw material in the stage of raw material charging (Step S1). In case the deodorant/agent
10 manufactured by graft polymerization method and using pulp as base material is fiber material already cut into fine pieces, it may be intermingled with the initial raw material between the Steps S3 and S4 in the flow chart of Fig. 4.

15 Specifically, Fig. 5 represents a variation of the flow shown in Fig. 4. In Step S1A, a first raw material, i.e. a pulp used as the initial raw material for paper, is charged. After the process of beating (Step S3), a second raw material, i.e. a
20 deodorant/agent manufactured by graft polymerization and using pulp as a base material, is charged (Step S1B). Thereafter, paper is manufactured as in the flow chart of Fig. 4 through the processes of agitation (Step S2), water-adding (Step S4),
25 additional beating (Step S5), paper-making (Step S6),

and drying (Step S7).

The deodorant/agent manufactured by graft polymerization method and using pulp as base material is intermingled with the initial raw material at a predetermined ratio. If several tens of grams of the deodorant/agent is intermingled with the initial raw material per one square meter of the finished paper, deodorant effect and effect for removing harmful substances suitable for practical use can be provided. In particular, the chemical action of the deodorant/agent manufactured by graft polymerization method and using pulp as base material, i.e. the effects for deodorizing and for removing harmful substances, do not change even when it is cut to fine pieces, and the effects can be provided even when it is intermingled with the raw material pulp. The method shown in Fig. 4 and Fig. 5 is different from the method shown in Fig. 3 in that the paper is manufactured from the first stage. If the finished products are compared, the manufacturing cost is lower in the products manufactured by the methods of Fig. 4 and Fig. 5.

The sheet of the present invention produced by the methods shown in Fig. 3 to Fig. 5 is laid under bed cloth as bed sore preventing sheet as shown in

Fig. 1. In addition, it can be further processed and may be used as a bed cloth, or it may be used as a textile material for mattress, bed or bed pad, or a lining material of these products.

5 In the embodiment described above, explanation has been given on sheet-like bedsore preventing products made of nonwoven fabric or paper, while textile material may be used as the sheet instead of nonwoven fabric. In case of cloth or textile
10 material, it is more efficient in the manufacturing process to impregnate it with the deodorant/agent in the state of threads before weaving, and graft polymerization is performed instead of impregnating it with the deodorant/agent after it has been woven
15 as cloth or textile. To perform graft polymerization by impregnating the threads with the deodorant/agent, the same method as the method explained in connection with Fig. 3 may be applied.

20 INDUSTRIAL APPLICABILITY

As described above, according to the present invention, a sheet made of nonwoven fabric or paper is impregnated with a deodorant also serving as an agent for removing harmful substances in liquid
25 state, and γ -ray is irradiated for graft

polymerization. As a result, the duration of the deodorant effect and the effect for removing harmful substances is very long. When it is applied for bedding materials, smelling components and harmful substances near a bedridden patient's body can be effectively removed, and bed sore caused by these substances can be effectively prevented. When paper is manufactured, the deodorant/agent manufactured by graft polymerization method and using pulp as base material is intermingled in the raw material pulp, and it is possible to extend the duration of the deodorant effect and the effect for removing harmful substances. When this is applied as bedding materials, the same effect can be provided at lower cost. Further, the threads before weaving textile material may be impregnated with the deodorant/agent. For graft polymerization, γ -ray is irradiated, and similar effects can be provided when the textile material made of such threads is used.